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N 536 - Utilization of Nursing Research in Advanced Practice, Summer 2008

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Research Design

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Design Characteristics

- Maximizes control over factors to increase the validity of the findings
- Guides the researcher in planning and implementing a study
Level of Control: Quantitative Research

- Descriptive
- Correlational
- Quasi-experimental
- Experimental

Increased Control with Design
Concepts Relevant to Research Design (1)

Causality
A \[\rightarrow\] B
Pressure \[\rightarrow\] Ulcer

Multicausality
Years smoking \[\rightarrow\] Heart disease
High fat diet \[\rightarrow\] Heart disease
Limited exercise \[\rightarrow\] Heart disease
Concepts Relevant to Research Design (2)

- Probability: Likelihood of an outcome
- Bias: Slanting findings
- Manipulation: Treatment
- Control: All phases of design
Design Validity

- Measure of accuracy of a study
- Examined with critique of the following dimensions:
  - Statistical conclusion validity
  - Internal validity
  - Construct validity
  - External validity
Elements of a Strong Research Design (1)

- Controlling the environment of the study setting

- Levels of controlling:
  - Natural setting
  - Partially controlled setting: e.g., clinics
  - Highly controlled setting: e.g., laboratory
Elements of a Strong Research Design (2)

- Controlling the equivalence of subjects and groups
  - Random subject selection
  - Random assignment to groups
Elements of a Strong Research Design (3)

- **Controlling the treatment**
  - Choose a treatment based on research and practice
  - Develop a protocol for implementation
  - Document the implemented treatment
  - Use a check-list to determine the extent of completeness to which the treatment was implemented
  - Evaluate the treatment during the study
Elements of a Strong Research Design (4)

- Controlling measurement
  - Reliability
  - Validity
  - Number of measurement methods
  - Types of instruments
Elements of a Strong Research Design (5)

- **Controlling extraneous variables**
  - Identify and eliminate extraneous variables via sample criteria, choice of settings, or research design
  - Random sampling
  - Sample: Heterogenous, homogeneous, or matching
  - Statistical control
Problems with Study Designs

- Inappropriate for the study purpose or the research framework
- Poorly developed designs
- The research methods were poorly implemented
- Inadequate treatment, sample, or measurement methods
Selecting a Design

- Is there a treatment?
  - Yes
  - Is the treatment tightly controlled by the researcher?
    - Yes
    - Will a randomly assigned control group be used?
      - Yes
      - Is the original sample randomly selected?
        - Yes
        - Experimental Study
      - No
    - No
  - No
    - Is the primary purpose examination of relationships?
      - Yes
        - Quasi-Experimental Study
      - No
        - Correlational Design
      - Experimental Study
    - No
      - Descriptive Design
Selecting a Descriptive Design

Examination sequences across time?

No

One Group?

No

Comparative Descriptive Design

Yes

Descriptive Design

Data collected across time?

No

Cross-sectional design

Yes

Studying events partitioned across time?

No

Trend Analysis

Yes

Repeated measures of each subject

Yes

Longitudinal Study

No

Case Study

Yes

Single unit of study
A Typical Descriptive Design

Clarification → Measurement → Description → Interpretation

Phenomenon of Interest

Variable 1

Variable 2

Variable 3

Variable 4

Description of Variable 1

Description of Variable 2

Description of Variable 3

Description of Variable 4

Interpretation of Meaning

Development of Hypotheses

Research Design
A Comparative Descriptive Design

Group I {variables measured} → Describe → Comparison of Groups on Selected Variables → Interpretation of Meaning

Group II {variables measured} → Describe → Development of Hypotheses
Selecting the Type of Correlational Design

- **Describe relationships between/among variables?**
  - Descriptive correlational design

- **Predict relationships between/among variables?**
  - Predictive correlational design

- **Test theoretically proposed Relationships?**
  - Model testing design
A Descriptive Correlational Design

**Measurement**

- Research Variable 1
- Research Variable 2

- Description of variable
- Examination of Relationship
- Interpretation of Meaning
- Development of Hypotheses
A Predictive Design

Value of Intercept

Value of Independent Variable 1

Value of Independent Variable 2

= Predicted Value of Dependent Variable
Selecting The Type of Quasi-Experimental Design

- Control Group?
  - No
    - Pretest?
      - No
        - One-group post-test only design
      - Yes
        - Comparison with population values?
          - No
            - Suggest Reevaluating design
          - Yes
            - Strategy for Comparison
              - No
                - One group pretest/post-test design
              - Yes
                - Compare treatment & control conditions?
  - Yes
    - Pretest?
      - No
        - One-group post-test only design
      - Yes
        - Repeated Measures?
          - No
            - Strategy for Comparison
          - Yes
            - Compare treatment & control conditions?
Selecting The Type of Experimental Design

Pretest

- No
  - Post-test only control group design

- Yes
  - Repeated Measurements?
    - No
      - Examine effects of confounding variables?
        - No
          - Multiple sites?
            - Pretest/post-test control group design
            - Randomized clinical trials
        - Yes
          - Blocking?
            - No
              - Comparison of multiple levels of treatment
                - No
                  - Examination of complex relationships among variables in relation to treatment
                - Yes
                  - Randomized Block Design
            - Yes
              - Nested Designs
## Pretest-Post Test, Control Group Designs

<table>
<thead>
<tr>
<th>Measurement of dependent variables</th>
<th>Manipulation of independent variables</th>
<th>Measurement of dependent variables</th>
</tr>
</thead>
<tbody>
<tr>
<td>Randomly selected experimental group</td>
<td>PRETEST</td>
<td>TREATMENT</td>
</tr>
<tr>
<td>Randomly selected control group</td>
<td>PRETEST</td>
<td></td>
</tr>
</tbody>
</table>

### Treatment:
Under control of researcher

### Findings:
- Comparison of pretest and post-test scores
- Comparison of experimental and control groups
- Comparison of pretest-post-test differences between samples

### Example:
Yourself (1990). The impact of group reminiscence counseling on a depressed elderly population.

### Uncontrolled threats to validity:
- Testing
- Mortality

### Instrumentation
- Restricted generalizability as control increases
## Post-Test-Only Control Group Design

<table>
<thead>
<tr>
<th>Randomly selected experimental group</th>
<th>Randomly selected control group</th>
<th>Treatment:</th>
<th>Findings:</th>
<th>Example:</th>
<th>Uncontrolled threats to validity:</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Measurement of independent variables</th>
<th>Measurement of dependent variables</th>
</tr>
</thead>
<tbody>
<tr>
<td>TREATMENT</td>
<td>POST-TEST</td>
</tr>
<tr>
<td>POST-TEST</td>
<td>POST-TEST</td>
</tr>
</tbody>
</table>
### Nested Design

#### Pain Control Management

<table>
<thead>
<tr>
<th>Traditional care</th>
<th>Unit A</th>
<th>Unit B</th>
<th>Unit C</th>
<th>Unit D</th>
<th>Unit E</th>
<th>Unit F</th>
<th>Unit G</th>
<th>Unit H</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRN Medication</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>New approach: “Around the clock” medication</td>
<td>Unit E</td>
<td>Unit F</td>
<td>Unit G</td>
<td>Unit H</td>
<td></td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

- **Primary Nursing Care**
  - **Primary Care**
  - **No Primary Care**

*Research Design*
Advantages of Experimental Designs

- More controls in design and conducting a study
- Increased internally validity
  - Decreased threats to design validity
- Fewer rival hypotheses
Advantages of Quasi-Experimental Designs

- More practical
  - Ease of implementation
- More feasible
  - Resources, subjects, time, setting
- More generalizable
  - Comparable to practice
Developing the Design Section of Your Proposal

- Identify the design
  - Name it specifically
- Provide a map of the design
- Discuss your rationale for using this design
- Describe threats to the validity of the chosen design